

**REMARKS**

Claims 1 and 13 have been amended based on, e.g., recitations in claim 3 (without the proportion of each aromatic compound repeating unit recited in claim 3) and to correct a mistranslation.

In this regard, Applicants note that the basis for incorporating claim 3 into claim 1 can be found in page 40, lines 13 through 20 of the original specification. Although there is no clear statement that the aromatic compound unit must be a repeating unit, Applicants submit that such is self-apparent from the production method of the polymer used in the invention. Also, Applicants refer to page 44, lines 1-11, indicating that aromatic compound unit of the sulfonated polyarylene polymer is a repeating unit (although the actual word used therein is “repeated structural unit”).

Applicants submit that the basis for amending the mistranslation concerning second polymer electrolyte to “hydrocarbon polymer electrolyte other than the sulfonated polyarylene polymer which is the first polymer electrolyte” can be found at page 32, lines 8 through 15 of the original specification.

Entry of the above amendment is respectfully requested.

**Preliminary Matter**

On the Office Action Summary, the Examiner has acknowledged Applicants’ claim for priority but has indicated that only some of the priority documents have been received. The Examiner does not indicate in the Office Action which priority documents were not received,

though, and instead simply acknowledges in paragraph 2 on page 2 of the Office Action that papers submitted under 35 U.S.C. 119 were received.

On review, Applicants note that all the certified copies of the priority documents were submitted when the application was filed, so Applicants request that the Examiner indicate in the next communication from the PTO that all the certified copies have been received.

### **Objection to the Abstract**

On page 3 of the Office Action, in paragraph 6, the Examiner has objected to the abstract because it exceeds 150 words.

In response, Applicants have amended the abstract to limit it to no more than 150 words. Accordingly, withdrawal of this objection is respectfully requested.

### **Anticipation Rejection over Yen**

On page 3 of the Office Action, in paragraph 8, claims 1, 7 and 10-13 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,795,496 (Yen).

### **The Examiner's Position**

The Examiner indicates that Yen discloses a polymer electrolyte membrane and fuel cell comprising both SPEEK and SPES (col. 10, lines 34-37, as applied to claims 1 and 11-13). Further, the Examiner indicates that the Yen product has the same sulfonated polyarylene monomer in the same molar proportion as the present invention and thus is expected to have the same ion exchange capacity as recited in present claims 7 and 10.

**Applicants' Response**

In response, Applicants note that independent claims 1 and 13 have been amended to include recitations from claim 3, which has not been included in this rejection.

Applicants submit that Yen neither teaches nor suggests the use of a polymer comprising “a repeating unit with an electron-attractive group in the principal chain thereof” and “a repeating unit without an electron-attractive group in the principal chain thereof”, together with a polymer electrolyte comprising a hydrocarbon polymer electrolyte other than the sulfonated polyarylene polymer which is the first polymer electrolyte.

In view of the above, Applicants submit that the invention as recited in the amended claims is not anticipated by (or obvious over) Yen. Accordingly, withdrawal of this rejection is respectfully requested.

**Anticipation Rejection over Fenton**

On page 4 of the Office Action, in paragraph 9, claims 1, 7 and 10-13 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,465,136 (Fenton).

**The Examiner's Position**

The Examiner appears to consider that Fenton discloses a polymer electrolyte membrane and fuel cell comprising sulfonated PEEK, sulfonated poly(phenylene oxide) and combinations thereof (col. 4, lines 43-54, as applied to claims 1 and 11-13). The Examiner indicates that the prior art product has the same sulfonated polyarylene monomer in the same molar proportion as

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the present invention and thus is expected to have the same ion exchange capacity as recited in claims 7 and 10.

**Applicants' Response**

In response, Applicants note that independent claims 1 and 13 have been amended to include recitations from claim 3, which has not been included in this rejection.

Applicants submit that Fenton neither teaches nor suggests the use of a polymer comprising "a repeating unit with an electron-attractive group in the principal chain thereof" and "a repeating unit without an electron-attractive group in the principal chain thereof", together with a polymer electrolyte comprising a hydrocarbon polymer electrolyte other than the sulfonated polyarylene polymer which is the first polymer electrolyte.

In view of the above, Applicants submit that the invention as recited in the amended claims is not anticipated by (or obvious over) Fenton. Accordingly, withdrawal of this rejection is respectfully requested.

**Anticipation Rejection over Goto**

On page 4 of the Office Action, in paragraph 10, claims 1-13 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,556,626 (Goto).

**The Examiner's Position**

The Examiner indicates that Goto claims a composite polymer electrolyte membrane and fuel cell comprising monomer A: 4,4'-bis (4-chlorobenzoyl) diphenylether and monomer B: 2,5,-dichloro-4-phenoxybenzophenone, wherein the resultant mixture is sulfonated (claim 5 as

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applied to claims 1, 3, 4, and 6-13). Also, the Examiner indicates that the first monomer is present in a mol amount between 3-60 mol % and the second monomer is present in a mol amount between 40-97 mol % (claim 1 as applied to claims 2, 3, 5, 6, 8, 9). In addition, the Examiner states that the electron attractive group includes -CONH-, -COO-, -SO-, etc. (claim 2 as applied to claim 4), and that the Goto product has the same sulfonated polyarylene monomer in the same molar proportion and thus is expected to have the same ion exchange capacity as recited in claims 7 and 10.

**Applicants' Response**

In response, Applicants submit that Goto only discloses the use of one polymer electrolyte (a copolymer of A and B), not a mixture of two types of polymer electrolytes as recited in present claims 1 and 13.

For instance, Example 4 of Goto teaches a polymer electrolyte corresponding to the first polymer electrolyte in Working Examples 16-18 at the bottom of page 103 in the present specification, but Goto's Example 4 does not teach a polymer electrolyte corresponding to the second polymer electrolyte in Working Examples 16-18 (which is the same as the second polymer electrolyte in Working Examples 7-12, i.e., PEEK as disclosed at the bottom of page 99 in the present specification).

Therefore, Applicants submit that Goto neither teaches nor suggests the present invention.

In view of the above, Applicants submit that the present invention is not anticipated by (or obvious over) Goto. Accordingly, withdrawal of this rejection is respectfully requested.

### **Anticipation Rejection over US '513**

On page 5 of the Office Action, in paragraph 11, claims 1-13 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2002/0164513 (US '513).

#### **The Examiner's Position**

The Examiner's basic position is that US '513 claims a composite polymer electrolyte and fuel cell comprising a sulfonated polyarylene polymer and hydrocarbon polymer sulfonate other than a sulfonated polyarylene polymer (claim 12 as applied to claims 1 and 13), wherein the amount of the two polymers are the same as the instant claims (claim 12 as applied to claims 2, 3, 5, 6, 8 and 9). The Examiner indicates that the ionic conductivity overlaps (claim 16 as applied to claims 7 and 10), and that the second polymer is sulfonated polyetheretherketone (claim 19 as applied to claims 11 and 12).

#### **Applicants' Response**

In response, Applicants note initially that the Examiner's reliance on claim 12 of US '513 appears misplaced, because claim 12 merely discloses one polymer electrolyte which is a copolymer, not a mixture of two types of polymer electrolyte as recited in present claims 1 and 13. Thus, the present invention distinguishes over claim 12 of US '513 in the same way that the present invention distinguishes over Goto as discussed above in connection with the preceding rejection.

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The closer disclosure in US '513 appears to be the disclosure of a composite polymer electrolyte membrane comprising a matrix made of a first sulfonated aromatic polymer having a high ion exchange capacity and a reinforcing material constituted by a second sulfonated aromatic polymer having a low ion exchange capacity in the form of fibers or a porous membrane (see, e.g., the Abstract).

However, US '513's composite membrane comprising a matrix and a reinforcement material is more like the composite membrane comprising a matrix and a reinforcement as recited in presently non-elected claim 14 rather than a mixture of two types of polymer electrolytes as in Working Examples 1-18 and as recited in independent claims 1 and 13, which the Examiner has indicated as being patentably distinct from claim 14 (see page 3 of the Office Action dated March 20, 2003).

Further, Applicants note that US '513 prefers that the two polymers have the same skeleton structure except for ion exchange capacity, because this makes the matrix and the reinforcing material have the same thermal expansion coefficient, thereby preventing the matrix from peeling from the reinforcing material (see paragraph 0064). In this regard, Applicants note that the only examples of the composite polymer electrolyte membrane of US '513 are Examples 5 and 6, in which the two polymers are the same type of polymer (i.e., sulfonated PEEK).

Applicants submit that this disclosure actually teaches away from the present invention, in which the two polymers are different types of polymers (e.g., if the second polymer electrolyte is sulfonated PEEK, the first polymer electrolyte is not sulfonated PEEK).

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Thus, Applicants submit that the claimed invention is not anticipated by (or obvious over) US '513. Accordingly, withdrawal of this rejection is respectfully requested.

**Anticipation Rejection under 35 U.S.C. 102(f)**

On page 6 of the Office Action, in paragraph 12, claims 1-13 are rejected under 35 U.S.C. 102(f) because the applicant does not appear to have invented the claimed subject matter.

**The Examiner's Position**

The Examiner indicates that the basis for his position is set forth in paragraphs 8 and 9 in the Office Action, but actually it appears that he intends to refer to paragraphs 10 and 11, which involve rejections of claims 1-13 (as compared with paragraphs 8 and 9, which involve rejections of only claims 1, 7 and 10-13).

**Applicants' Response**

In response, Applicants direct the Examiner's attention to the arguments set forth above in connection with the corresponding rejections, since they apply equally as well here.

Accordingly, Applicants submit that the present invention is not anticipated under 35 U.S.C. 102(f), and thus withdrawal of this rejection is respectfully requested.

**Obviousness-Type Double Patenting Rejection over Goto**

On page 6 of the Office Action, in paragraph 14, claims 1-13 rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of U.S. Patent No. 6,555,626 (Goto).

**The Examiner's Position**

The Examiner indicates that although the conflicting claims are not identical, they are not patentably distinct from each other for the reasons set forth in paragraph 10 of the Office Action.

**Applicants' Response**

In response, Applicants traverse this rejection based on the same reasoning as that presented above in response to the anticipation rejection over Goto.

Thus, Applicants submit that this obviousness-type double patent rejection has been overcome, and withdrawal of this rejection is respectfully requested.

**Provisional Obviousness-Type Double Patenting Rejection over US '513**

On page 7 of the Office Action, in paragraph 15, claims 1-13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 12-26 of U.S. patent Application Publication No. 2002/0164513 (US '513).

**The Examiner's Position**

The Examiner indicates that although the conflicting claims are not identical, they are not patentably distinct from each other for the reasons set forth in paragraph 11 of the Office Action.

**Applicants' Response**

In response, Applicants traverse this rejection based on the same reasoning as that presented above in response to the anticipation rejection over US '513.

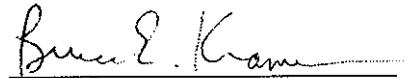
Thus, Applicants submit that this provisional obviousness-type double patent rejection has been overcome, and withdrawal of this provisional rejection is respectfully requested.

### Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Date: January 29, 2004